13.3 ~ Graphing Trigonometric Functions

Objectives:

1. Apply knowledge of transformations to the graphs of trigonometric functions.
2. Learn vocabulary associated with sinusoidal graphs.
3. Model real-world data with sine and cosine functions.

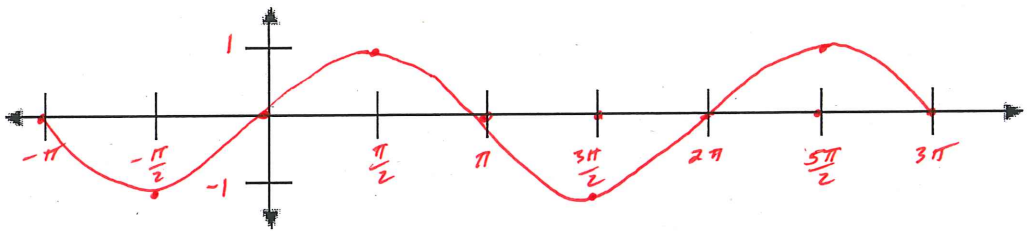
Circular Functions: A function of an _____.

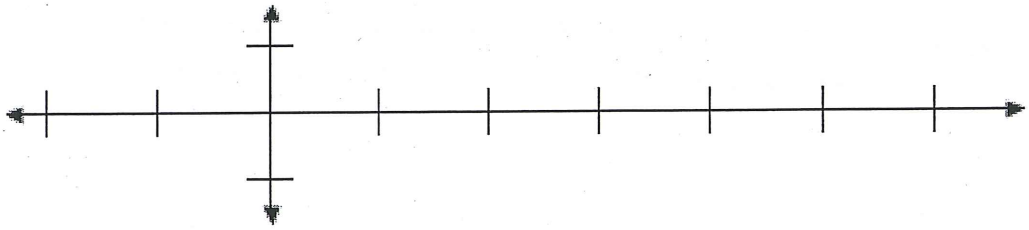
Periodic Function: A function that repeats its values in regular intervals.

Period: The time it takes for one complete cycle of a cyclical motion to take place.

Amplitude: half the distance of the maximum and minimum values of a periodic function.

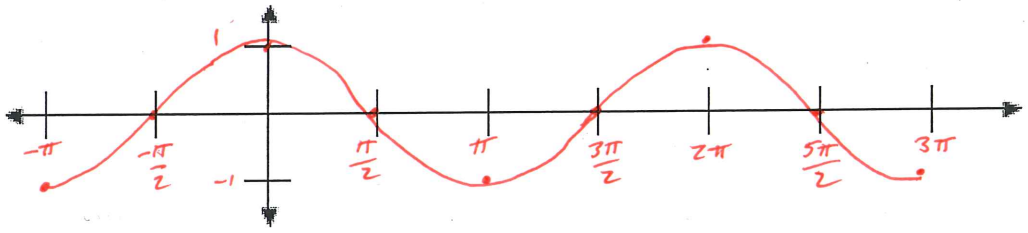
Graph $y = \sin\theta$

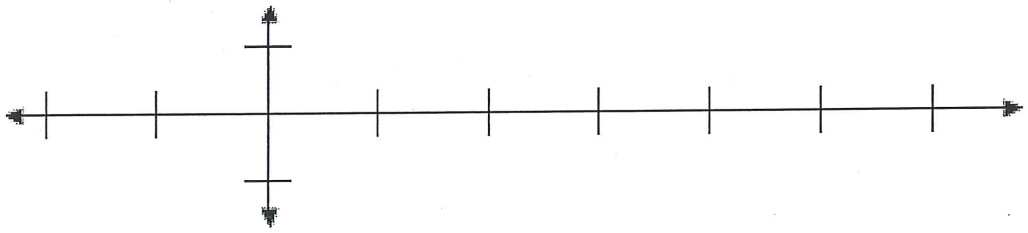




Accelerated Algebra II: Trigonometry ~ Part II

Graph $y = \cos\theta$





What are the differences between the sine and cosine graph?

sine wave is found by shifting the cosine wave $\frac{\pi}{2}$ to the right

How do these functions relate to the trigonometric ratios?

The x-coordinate represents the angle and the y-coordinate represents the trig ratio for that angle.

Accelerated Algebra II: Trigonometry ~ Part II

Review: Transformations

Given the equations below, describe their transformations from their parent function:

$y=(x+4)^2-5$

Horizontal translation of $y=x^2$ 4 to the left and vertical translation down 5.

$y=|x-2|+8$

Horizontal translation of $y=|x|$ right 2 and vertical translation up 8.

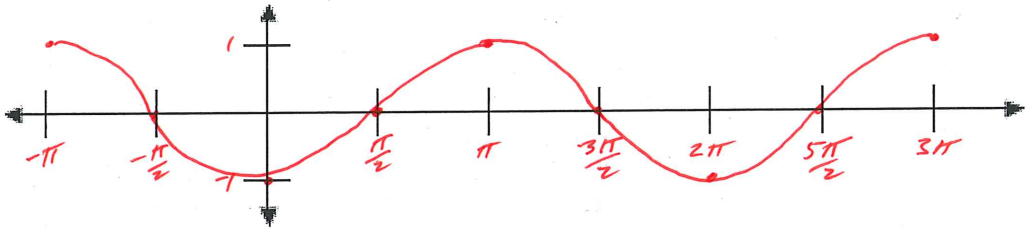
$y=-5\sqrt{x}$

Vertical stretch of $\sqrt{x}$ by a scale factor of 5 and vertical reflection across x-axis.

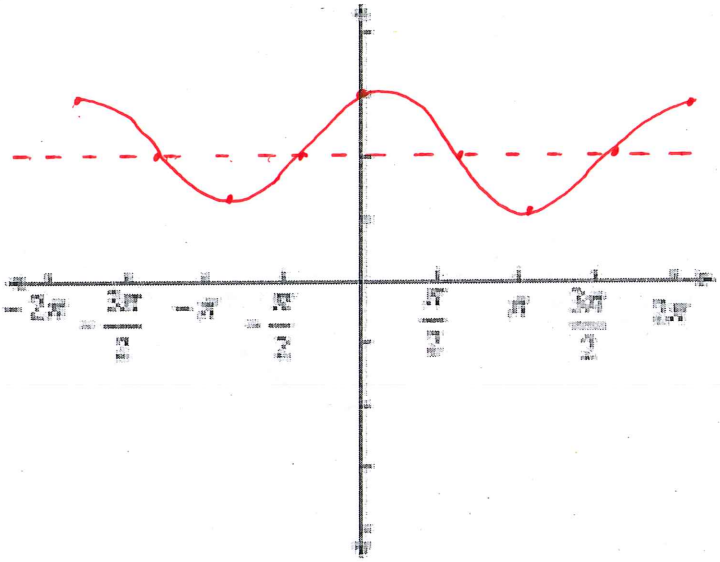
Using the same transformation rules, describe and graph the transformations to the functions below:

$y=\sin\left(\theta-\frac{\pi}{2}\right)$

Horizontal translation of $y=\sin\theta$ right $\frac{\pi}{2}$

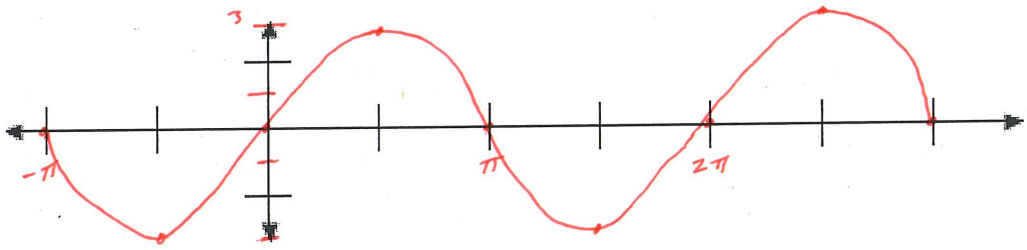


$y=\cos\theta+2$

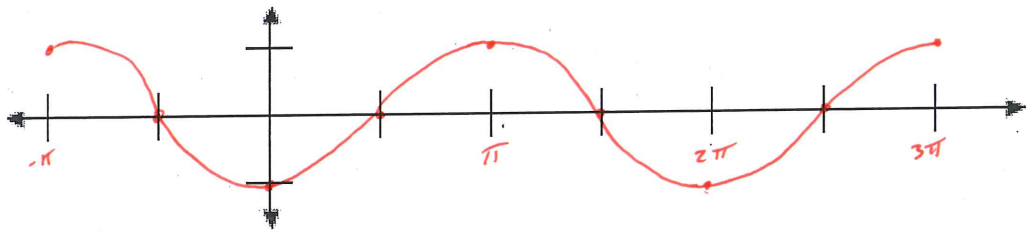


Accelerated Algebra II: Trigonometry ~ Part II

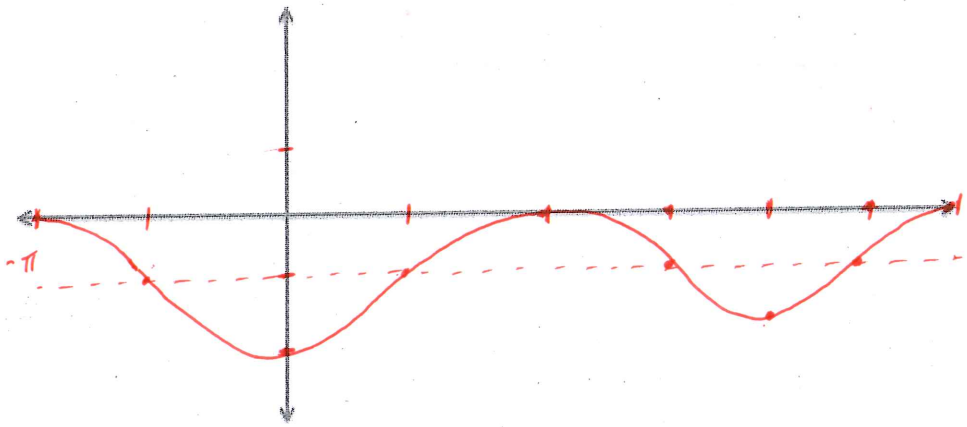
$y = 3\sin\theta$



$y = -\cos\theta$

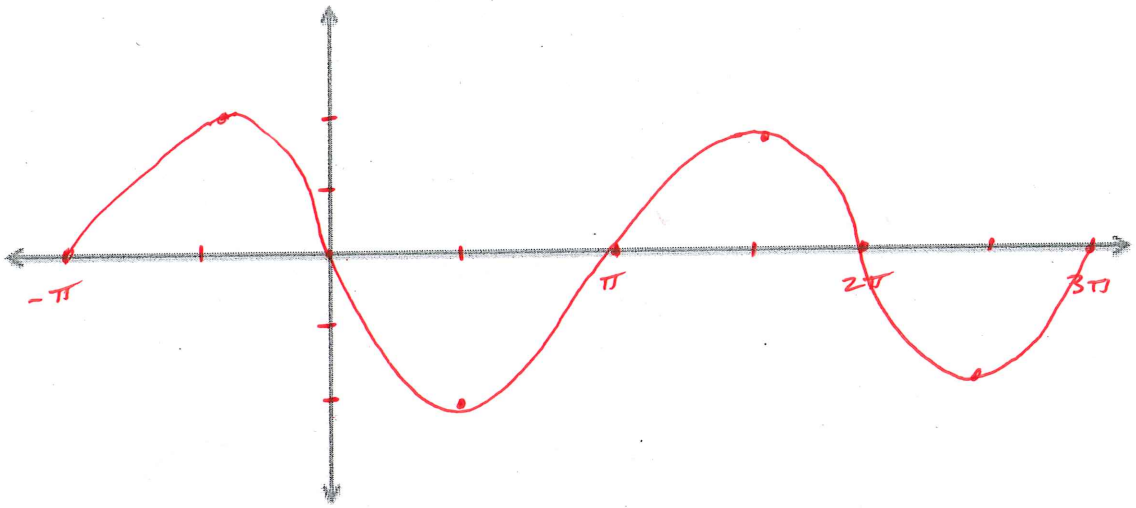


$y = \cos(\theta + \pi) - 1$



Accelerated Algebra II: Trigonometry ~ Part II

$y = -2\sin\theta$

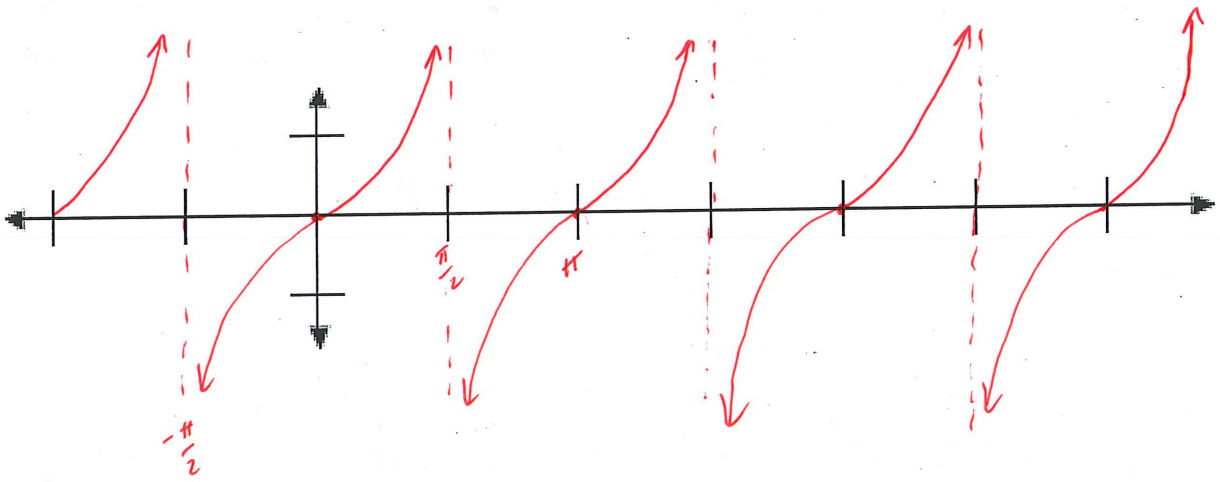


Find the following values to help create the graph $y = \tan\theta$:

$\tan 0 =$ 0 $\quad \tan\frac{\pi}{2} =$ undefined $\quad \tan\pi =$ 0

$\tan\frac{3\pi}{2} =$ undefined $\quad \tan 2\pi =$ 0

The graph below represents $y = \tan\theta$:



Graphing $y = A\cos Bx$ and $y = A\sin Bx$

$|A|$ is the amplitude $\longrightarrow$ how far above and below horizontal axis

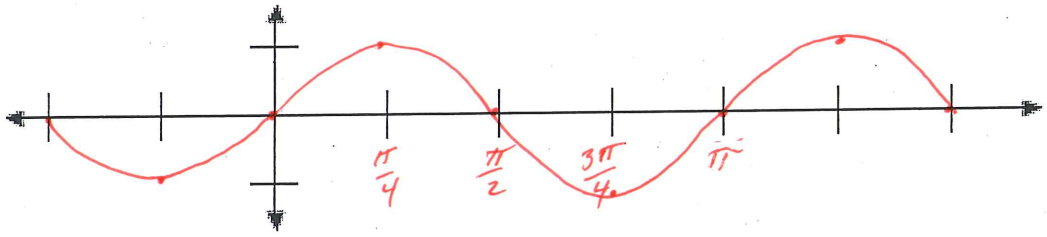
Period: $\dfrac{2\pi}{B}$

B >1: horizontal shrink $\longrightarrow$ period less than 2π

0 < B < 1: horizontal stretch $\longrightarrow$ period greater than 2π

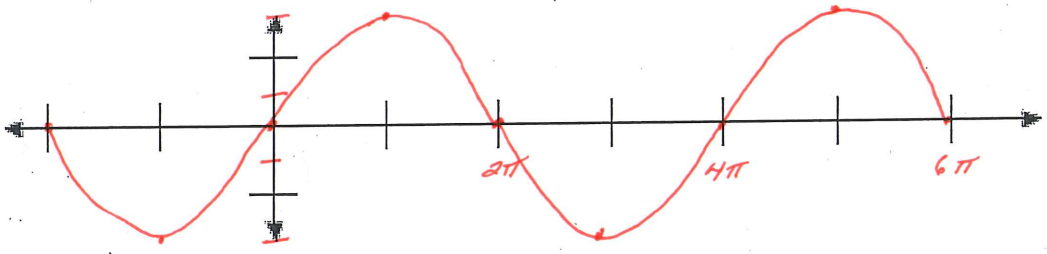
Period = $\frac{2\pi}{2} = \pi$

1) Graph: $y = \sin 2x$



Period = $\frac{2\pi}{\frac{1}{2}} = 2\pi \cdot \frac{2}{1} = 4\pi$

2) Graph: $y = 3\sin\left(\dfrac{1}{2}x\right)$



Period = $\frac{2\pi}{4} = \frac{\pi}{2}$

3) Graph: $y = 2\cos 4x$